

APJ 2527 Jm

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:	Erik W. Jensen	Examiner:	Jose H. Alcalá
Serial No.:	09/740,103	Group Art Unit:	2827
Filed:	December 18, 2000	Docket:	884.386US1
Assignee:	Intel Corporation	Customer No.:	21186
Title:	INTERCONNECT		

APPELLANTS' BRIEF ON APPEAL

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P.O. Box 1450
Alexandria, VA 22313-1450

This Appeal Brief is presented in support of the Notice of Appeal to the Board of Patent Appeals and Interferences, filed on May 19, 2004, from the final rejection of claims 2 to 5, 21 to 27, 29 to 31, and 35 to 37 of the above identified application as set forth in the final Office action mailed on December 31, 2003.

This Appeal Brief is filed accompanied the required fee and authorization to deduct the requisite fee set forth in 37 C.F.R. § 1.17(c), if the accompanying fee is insufficient.

Real Party in Interest

The real party in interest of the above identified application is the Intel Corporation as identified in the assignment recorded on December 18, 2000 (Reel/Frame 011406/0270) (3 pages).

Related Appeals and Interferences

There are no known appeals or interferences which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

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Status of Claims

Claims 2 to 5, 21 to 27, 29 to 31, and 35 to 37 stand rejected and are appealed. Claims 1, 6 to 20, 28, and 32 to 34 stand cancelled. Claims 38 to 40 stand withdrawn.

Status of Amendments

No amendments were filed subsequent to the final rejection.

Summary of Claimed Subject Matter

Each of the independent claims 2, 23, 29, and 35 include a substrate and a pad formed on the substrate (for example, Figure 1A, and pages 3 to 5). Each of the independent claims include at least two, three, four, or five vias coupled to the pad and only one via formed substantially beneath the pad (for example, Figure 1A, and pages 3 to 5).

Grounds of the Rejections to be Reviewed on Appeal

Claim 2 stands rejected under 35 U.S.C. § 102(e) as being anticipated by Memis (U.S. Patent No. 6,162,997).

Claim 3 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Memis (U.S. Patent No. 6,162,997) in view of Badet *et al.* (U.S. Patent No. 4,371,744).

Claim 4 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Memis in view of Goenka, *et al.* (U.S. Patent No. 4,371,744).

Claim 5 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Memis in view of Goenka *et al.* and further in view of Frei *et al.* (U.S. Patent No. 5,342,999).

Claims 21-22 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Memis in view of Barrow (U.S. Patent No. 5,706,178).

Claim 23 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Memis.

Claim 24 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Memis in view of Frei *et al.*

Claim 25 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Memis in view of Frei *et al.* and further in view of Barrow.

Claims 26 and 27 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Memis in view of Frei *et al.* and further in view of Sasaoka *et al.* (U.S. Patent No. 6,010,769).

Claim 29 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Memis.

Claim 30 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Memis in view of Frei *et al.*

Claim 31 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Memis in view of Frei *et al.* and further in view of Murayama (U.S. Patent No. 3,725,743).

Claim 35 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Memis.

Claim 36 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Memis in view of Murayama.

Claim 37 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Memis in view of Kondo *et al.*

Claims 3 and 4 stand rejected under 35 U.S.C. § 112, first paragraph, as failing to comply with the written description requirement.

Argument

Rejection Under 35 U.S.C. 102(a)

(Claim 2 - Memis)

Claim 2 stands rejected under 35 U.S.C. § 102(e) as being anticipated by Memis (U.S. Patent No. 6,162,997).

Anticipation can only be established by a single prior art reference which discloses each and every element of the claimed invention. *Structural Rubber Prod. Co. v. Park Rubber Co.*, 749 F.2d 707, 223 U.S.P.Q. 1264 (Fed Cir. 1984). Claim 2 recites, "at least two vias coupled to the pad." The Office action, at page 3, paragraph 3, states:

Memis teaches an interconnect comprising: a substrate (Reference numbers 12, 13, 14); a pad (Reference number 20) formed on the substrate; and at least two vias (Reference number 21, 26) coupled to the pad, wherein only one (Reference number 21) of the at least two vias is formed substantially beneath the pad.

Applicant submits that this statement quoted from the Office action does not accurately represent the Memis disclosures. Memis reference number 26 does not disclose vias as suggested in the statement quoted from the Office action. Memis, at column 2, line 16, recites, "plated through holes 26." Thus, the Examiner, in the Office action, is merely asserting, without support in Memis, that a recitation of "plated through holes" in Memis constitutes a disclosure of "vias" as recited in claim 2. An assertion in an Office action that lacks support in the cited reference does not constitute a disclosure. Hence, since Memis fails to disclose "vias," Memis fails to disclose "at least two vias coupled to the pad," as recited in claim 2. Thus, Memis fails to disclose each and every element of claim 2. Therefore, the Examiner erred in rejecting claim 2 as anticipated by Memis.

Rejection Under 35 U.S.C. 103(a)

(Claim 3 - Memis in view of Badet et al.)

Claim 3 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Memis in view of Badet *et al.* (U.S. Patent No. 4,371,744).

Claim 3 is dependent on claim 2. To establish the elements of claim 3, the Office action relies on Memis as stated at page 3, paragraph 4 of the Office action. Applicant submits, as argued above, with respect to the anticipation rejection, that Memis fails to disclose "vias" as recited in claim 2. Hence, the Office action fails to state a *prima facie* case of obviousness with respect to claim 3. Therefore, the Examiner erred in rejecting claim 3 for obviousness.

Rejection Under 35 U.S.C. 103(a)

(Claim 4 - Memis in view of Goenka *et al.*)

Claim 4 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Memis in view of Goenka *et al.* (U.S. Patent No. 4,371,744).

Claim 4 is dependent on claim 2. To establish the elements of claim 4, the Office action relies on Memis as stated at page 3, paragraph 4 of the Office action. Applicant submits, as argued above, with respect to the anticipation rejection, that Memis fails to disclose "vias" as recited in claim 2. Hence, the Office action fails to state a *prima facie* case of obviousness with respect to claim 4. Therefore, the Examiner erred in rejecting claim 4 for obviousness.

Rejection Under 35 U.S.C. 103(a)

(Claim 5 - Memis in view of Goenka *et al.* and further in view of Frei *et al.*)

Claim 5 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Memis in view of Goenka *et al.* and further in view of Frei *et al.* (U.S. Patent No. 5,342,999).

Claim 5 is depends on claim 4 and claim 2. To establish the elements of claim 2, the Office action relies on Memis as stated at page 3, paragraph 4 of the Office action. Applicant submits, as argued above, with respect to the anticipation rejection, that Memis fails to disclose "vias" as recited in claim 2. Hence, the Office action fails to state a *prima facie* case of obviousness with respect to claim 5. Therefore, the Examiner erred in rejecting claim 5 as being obvious.

Assuming *arguendo* that references teach or suggest the elements of a claim 5, the Office action must also provide specific, objective evidence of record for a finding of a suggestion or motivation to combine reference teachings and must explain the reasoning by which the evidence is deemed to support such a finding to establish a *prima facie* case of obviousness. *In re Sang Su Lee*, 277 F.3d 1338, 61 U.S.P.Q.2d 1430 (Fed. Cir. 2002). In an attempt to meet this standard, the Office action, at page 6, paragraph 8, states:

It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the teachings of Memis, Goenka and Frei, in order to have at least one of the only two of the three vias coupled

to the substantially straight edges is coupled to one of the substantially straight edges through the Frei tapered conductive segment, thus effectively and reliably connect the pad and the vias, without having to have a bigger pad, reducing the material used and in that way reducing the cost of manufacture.

Applicant submits that this statement does not provide objective evidence of record as required under *In re Sang Su Lee*. For example, the Office action states, "reducing the material used and in that way reducing the cost of manufacture." However, there is no citation to one of the cited patents to support this statement as being evidence of record. Further, applicant's representative has reviewed each of the cited patents and none appears to provide support for the statement "reducing the material used in that way reducing the cost of manufacture." Thus, the Office action fails to provide specific, evidence of record that supports a finding of a suggestion or motivation to combine the reference teachings. Hence the office action fails to state a *prima facie* case of obviousness with respect to claim 5. Therefore, the Examiner erred in rejecting claim 5 for obviousness.

Rejection Under 35 U.S.C. 103(a)

(Claims 21 and 22 - Memis in view of Barrow)

Claims 21-22 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Memis in view of Barrow (U.S. 5,706,178).

Claim 21 depends on claim 2. Claim 22 depends on claim 21. To establish the elements of claim 2, the Office action relies on Memis as stated at page 3, paragraph 4 of the Office action. Applicant submits, as argued above, with respect to the anticipation rejection, that Memis fails to disclose "vias" as recited in claim 2. Hence, the Office action fails to state a *prima facie* case of obviousness with respect to claims 21 and 22. Therefore, the Examiner erred in rejecting claims 21 and 22 as being obvious.

Rejection Under 35 U.S.C. 103(a)

(Claim 23 - Memis)

Claim 23 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Memis.

To establish obviousness, the references must teach or suggest all the claim elements. *In re Vaeck*, 947 F.2d 488, 20 U.S.P.Q.2d 1438 (Fed.Cir. 1991). Claim 23 recites, "wherein only one of the at least three vias is formed substantially beneath the pad." The Office action at page 7, paragraph 9, states:

Memis fails to explicitly teach that there are at least three, four or five vias coupled to the pad, wherein only one of the at least three, four, or five vias, is formed substantially beneath the pad.

In attempting to establish the obviousness of the recitation, "wherein only one of the at least three vias is form substantially beneath the pad," in claim 23 the Examiner at page 7, paragraph 9, states:

It would have been obvious to one having ordinary skill in the art at the time the invention was made to increase the number of vias connected to the pad in order to be able to transmit more electrical or thermal energy between the chip and a printed circuit board.

However, this statement fails to address the recitation, "wherein only one of the at least three vias is formed substantially beneath the pad." Hence, Memis fails to teach or suggest, "wherein only one of the at least three vias is formed substantially beneath the pad," so Memis fails to teach all of the elements of claim 23. Thus, the Office action fails to state a *prima facie* case of obviousness with respect to claim 23. Therefore, the Examiner erred in rejecting claim 23 for obviousness.

Rejection Under 35 U.S.C. 103(a)

(Claim 24 - Memis in view of Frei *et al.*)

Claim 24 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Memis in view of Frei *et al.* Claim 24 is dependent on claim 23. For reasons analogous

to those stated above and elements in the claim, applicant submits that the Examiner erred in rejecting claim 24 for obviousness.

Rejection Under 35 U.S.C. 103(a)

(Claim 25 - Memis in view of Frei *et al.* and further in view of Barrow)

Claim 25 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Memis in view of Frei *et al.* and further in view of Barrow. Claim 25 is dependent on claim 24. For reasons analogous to those stated above and elements in the claim, applicant submits that the Examiner erred in rejecting claim 25 for obviousness.

Rejection Under 35 U.S.C. 103(a)

(Claims 26 and 27 - Memis in view of Frei *et al.* and further in view of Sasaoka *et al.*)

Claims 26 and 27 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Memis in view of Frei *et al.* and further in view of Sasaoka *et al.* (U.S. 6,010,769).

To establish obviousness, the references must teach or suggest all the claim elements. *In re Vaeck*, 947 F.2d 488, 20 U.S.P.Q.2d 1438 (Fed.Cir. 1991). Claim 26 recites, "wherein the tapered conductive segment comprises a hyperbolic taper." The Office action at page 10, paragraph 13, states:

Sasaoka teaches a tapered conductive segment comprising a hyperbolic taper (Reference number 14 in Figure 4).

Applicant submits that this statement quoted from the Office action does not accurately represent Sasaoka disclosures. Applicant's representative has reviewed Sasaoka and is unable to find the word "hyperbolic" in Sasaoka. Hence, Memis fails to teach or suggest, a "hyperbolic taper," so Sasaoka fails to teach all of the elements of claim 26. Thus, the Office action fails to state a *prima facie* case of obviousness with respect to claim 26. Therefore, the Examiner erred in rejecting claim 26 for obviousness.

Claim 27 is dependent on claim 26. For reasons analogous to those stated above and elements in the claims, applicant submits that the Examiner erred in rejecting claim 27 for obviousness.

Rejection Under 35 U.S.C. 103(a)

(Claim 29 - Memis)

Claim 29 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Memis.

To establish obviousness, the references must teach or suggest all the claim elements. *In re Vaeck*, 947 F.2d 488, 20 U.S.P.Q.2d 1438 (Fed.Cir. 1991). Claim 29 recites, "wherein only one of the at least four vias is formed substantially beneath the pad." The Office action at page 7, paragraph 9, states:

Memis fails to explicitly teach that there are at least three, four or five vias coupled to the pad, wherein only one of the at least three, four, or five vias, is formed substantially beneath the pad.

In attempting to establish the obviousness of the recitation, "wherein only one of the at least four vias is form substantially beneath the pad," in claim 29 the Examiner at page 7, paragraph 9, states:

It would have been obvious to one having ordinary skill in the art at the time the invention was made to increase the number of vias connected to the pad in order to be able to transmit more electrical or thermal energy between the chip and a printed circuit board.

However, this statement fails to address the recitation, "wherein only one of the at least four vias is formed substantially beneath the pad." Hence, Memis fails to teach or suggest, "wherein only one of the at least four vias is formed substantially beneath the pad," so Memis fails to teach all of the elements of claim 29. Thus, the Office action fails to state a *prima facie* case of obviousness with respect to claim 29. Therefore, the Examiner erred in rejecting claim 29 for obviousness.

Rejection Under 35 U.S.C. 103(a)

(Claim 30 - Memis in view of Frei *et al.*)

Claim 30 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Memis in view of Frei *et al.* Claim 30 is dependent on claim 29. For reasons analogous

to those stated above and elements in the claims, applicant submits that the Examiner erred in rejecting claim 30 for obviousness.

Rejection Under 35 U.S.C. 103(a)

(Claim 31 - Memis in view of Frei *et al.* and further in view of Murayama)

Claim 31 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Memis in view of Frei *et al.* and further in view of Murayama (U.S. 3,725,743). Claim 31 is dependent on claim 30 and claim 30 is dependent on claim 29. For reasons analogous to those stated above and elements in the claims applicant submits that the Examiner erred in rejecting claim 31 for obviousness.

Rejection Under 35 U.S.C. 103(a)

(Claim 35 - Memis)

Claim 35 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Memis.

To establish obviousness, the references must teach or suggest all the claim elements. *In re Vaeck*, 947 F.2d 488, 20 U.S.P.Q.2d 143 (Fed.Cir. 1991). Claim 35 recites, "wherein only one of the at least five vias is formed substantially beneath the pad." The Office action at page 7, paragraph 9, states,

Memis fails to explicitly teach that there are at least three, four or five vias coupled to the pad, wherein only one of the at least three, four, or five vias, is formed substantially beneath the pad.

In attempting to establish the obviousness of the recitation, "wherein only one of the at least five vias is form substantially beneath the pad," in claim 35 the Examiner at page 7, paragraph 9, states:

It would have been obvious to one having ordinary skill in the art at the time the invention was made to increase the number of vias connected to the pad in order to be able to transmit more electrical or thermal energy between the chip and a printed circuit board.

However, this statement fails to address the recitation, "wherein only one of the at least five vias is formed substantially beneath the pad." Hence, Memis fails to teach or suggest, "wherein only one of the at least five vias is formed substantially beneath the pad," so Memis fails to teach all of the elements of claim 35. Thus, the Office action fails to state a *prima facie* case of obviousness with respect to claim 35. Therefore, the Examiner erred in rejecting claim 35 for obviousness.

Rejection Under 35 U.S.C. 103(a)

(Claim 36 - Memis in view of Murayama)

Claim 36 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Memis in view of Murayama. Claim 36 is dependent on claim 35. For reasons analogous to those stated above and elements in the claims, applicant respectfully submits that the Examiner erred in rejecting claim 36 for obviousness.

Rejection Under 35 U.S.C. 103(a)

(Claim 37 - Memis in view of Kondo *et al.*)

Claim 37 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Memis in view of Kondo *et al.* Claim 37 is dependent on claim 35. For reasons analogous to those stated above and elements in the claims, applicant respectfully submits that the Examiner erred in rejecting claim 37 for obviousness.

Rejections Under 35 U.S.C. 112

(Claims 3 and 4)

Claims 3 and 4 stand rejected under 35 U.S.C. § 112, first paragraph, as failing to comply with the written description requirement.

The Office action, at page 2, paragraph 2, states:

Regarding Claim 3, the recitation: "at least one of the at least two vias is coupled to the pad by a conductive segment", is giving space to the possibility that all of "the at least two vias" are coupled to the pad by a conductive segment, which is not supported in the drawings or in the specification.

Regarding claim 4, the recitation: "only two of the three vias are coupled to the substantially straight edges", is giving space to the possibility that the via that is substantially beneath the pad is coupled to the substantially straight edges of the conductive segment, which is not supported in the drawings or in the specification.

Applicant submits that the Examiner has applied an improper standard for the written description requirement. The Examiner has applied an *ipsis verbis* standard. The proper standard is provided in *Fujikawa v. Wattanasin*, 93 F.3d 1559, 39 U.S.P.Q.2d 1895 (Fed. Cir. 1996) which states:

[I]*ipsis verbis* disclosure is not necessary to satisfy the written description requirement of section 112. Instead, the disclosure need only reasonably convey to persons skilled in the art that the inventor had possession of the subject matter in question.

Application of the standard of *Fujikawa v. Wattanasin* clearly shows that the inventor was in possession of the subject matter of claims 3 and 4. One skilled in the art can see from the claims, specification, and drawings, that each of the elements of claims 3 and 4 is disclosed. Therefore, the Examiner erred in rejecting claims 3 and 4 for failure to meet the written description requirement.

Claims Appendix

2. An interconnect comprising:
a substrate;
a pad formed on the substrate; and
at least two vias coupled to the pad, wherein only one of the at least two vias is formed substantially beneath the pad.
3. The interconnect of claim 2, wherein at least one of the at least two vias is coupled to the pad by a conductive segment having a first end having a first width and a second end having a second width, the first end being connected to the at least one of the at least two vias and the second end being connected to the pad, and the first width being less than the second width.
4. The interconnect of claim 2, wherein the pad has at least five substantially straight edges and the at least two vias comprise three vias and only two of the three vias are coupled to the substantially straight edges.
5. The interconnect of claim 4, wherein at least one of the only two of the three vias coupled to the substantially straight edges is coupled to one of the substantially straight edges through a tapered conductive segment.
21. The interconnect of claim 2, wherein the pad comprises copper.
22. The interconnect of claim 21, wherein the at least two vias comprise cylindrical conductors.

23. An interconnect comprising:
a substrate;
a pad formed on the substrate; and
at least three vias coupled to the pad, wherein only one of the at least three vias is formed substantially beneath the pad.
24. The interconnect of claim 23, wherein at least one of the at least three vias is coupled to the pad by a tapered conductive segment.
25. The interconnect of claim 24, wherein the tapered conductive segment comprises copper.
26. The interconnect of claim 25, wherein the tapered conductive segment comprises a hyperbolic taper.
27. The interconnect of claim 26, wherein the pad comprises gold.
29. An interconnect comprising:
a substrate;
a pad formed on the substrate; and
at least four vias coupled to the pad, wherein only one of the at least four vias is formed substantially beneath the pad.
30. The interconnect of claim 29, wherein at least three of the at least four vias is coupled to the pad by a tapered conductive segment.
31. The interconnect of claim 30, wherein the tapered conductive segment comprises aluminum.

35. An interconnect comprising:
a substrate;
a pad formed on the substrate; and
at least five vias coupled to the pad, wherein only one of the at least five vias is
formed substantially beneath the pad.
36. The interconnect of claim 35, wherein the pad comprises silver.
37. The interconnect of claim 36, wherein the at least five vias comprise hexagonal
conductors.

Evidence Appendix

No evidence has been relied on in this appeal.

Related Proceedings Appendix

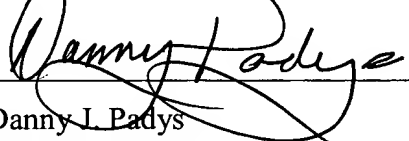
No related proceedings have been identified in the Related Appeals and Interferences section.

Respectfully submitted,


Erik W. Jensen

By his Representatives,

SCHWEGMAN, LUNDBERG, WOESSNER & KLUTH, P.A.
Attorneys for Intel Corporation
P.O. Box 2938
Minneapolis, MN 55402
612-373-6900

Date November 19, 2004 By 
Danny L. Padys
Reg. No. 35,635

CERTIFICATE UNDER 37 C.F.R. 1.8: The undersigned hereby certifies that this correspondence is being deposited with the United States Postal Service with sufficient postage as first class mail, in an envelope addressed to: Mail Stop Appeal Brief-Patents, P.O. Box 1450, Alexandria, VA 22313-1450, on this 19th day of November, 2004.

DANNY PADYS 
Name Signature